What is claimed is:

1. A thickness measurement system, comprising:

an electromagnetic cavity resonator having an exposed side;

a signal decoupler coupled to the cavity resonator;

an signal amplitude detector coupled to the decoupler;

a frequency signal generator coupled to the processing unit and to the decoupler;

a processing unit coupled to the amplitude detector that processes; and

a correlating algorithm correlating a resonant frequency shift detected by the amplitude detector to a surface thickness of a sample being measured.

2. The thickness measurement system of claim 1, wherein the electromagnetic cavity resonator has a plurality of cavities.

3. The thickness measurement system of claim 1, wherein the frequency signal generator is one of a Gunnplexer is or a Gunn Diode.

4. The thickness measurement system of claim 1, further comprising a suction assembly that applies pressure to the cavity resonator to retain it upon the measurement sample.

5. The thickness measurement system of claim 1, wherein the amplitude detector detects a voltage.

6. The thickness measurement system of claim 1, wherein the amplitude detector detects a power.

7. The thickness measurement system of claim 1, further comprising:

a DC supply coupled to the frequency generator.

8. The thickness measurement system of claim 1, further comprising:

a varactor DC supply capable of controlling a frequency generator output frequency.

9. The thickness measurement system of claim 1, wherein the processing unit is a personal computer.

10. The thickness measurement system of claim 1, wherein the cavity resonator is resonant at a natural frequency of approximately 10.6 GHz.

11. A thickness measurement system, comprising:

a resonating means for resonating an electromagnetic signal, having an exposed side;

a decoupler means for decoupling signals from the resonating means, and connected to the resonating means;

an signal detecting means for detecting an amplitude of signals from the decoupler means, and connected to the decoupler means;

a frequency signal generating means for generating frequency signals, coupled to the processing means and the decoupler means; and

a processing means for processing, coupled to the signal detecting means, or having;

correlating means for correlating a resonant frequency shift detected by the detecting means to a surface thickness of a sample being measured.

12. The thickness measurement system of claim 11, wherein the frequency signal generating means utilizes a Gunplexer to generate frequencies.

13. The thickness measurement system of claim 11, wherein the resonating means has a plurality of cavities.

14. The thickness measurement system of claim 11, wherein the frequency signal generating means has Schottky diodes.

15. The thickness measurement system of claim 12, wherein the Gunnplexer is a Gunn Diode.

16. The thickness measurement system of claim 11, further comprising a suction means for applying a pressure to the resonator means to retain it upon the measurement sample.

17. The thickness measurement system of claim 11, wherein the detecting means detects a voltage.

18. The thickness measurement system of claim 11, wherein the detecting means detects a power.

19. The thickness measurement system of 11, further comprising:

a DC supply means coupled to the frequency signal generating means.

20. The thickness measurement system of claim 11, wherein the processing means is a personal computer.

21. The thickness measurement system of claim 11, wherein the resonating means is resonant at a natural frequency of approximately 10.6 GHZ.

22. A method for thickness measurement, comprising the steps of:

abutting an open faced electromagnetic cavity resonator to a sample

having a film thickness;

sweeping frequencies in the cavity resonator using a signal generator having a Gunplexer;

detecting a resonant frequency of the cavity resonator using a reflected energy detector; and

determining the thickness of the film from a correlation of a shift of the resonant frequency.

23. The method of claim 22, wherein the correlation is based on a first order equation.